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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/810,828	03/16/2001	Sohrab Zarrabian	OC0104US	6761

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EXAMINER
ARTMAN, THOMAS R

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 08/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/810,828	ZARRABIAN ET AL.	
	Examiner	Art Unit	
	Thomas R Artman	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-26 is/are pending in the application.

4a) Of the above claim(s) 17-25 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-16 and 26 is/are rejected.

7)☒ Claim(s) 6-8, 11 and 14 is/are objected to.

8)☒ Claim(s) 17-25 are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-16 and 26, drawn to a spectrometer apparatus, classified in class 356, subclass 454.

II. Claims 17-25, drawn to a calibration method, classified in class 250, subclass 252.1.

Inventions I and II are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product (MPEP § 806.05(h)). In the instant case the method of calibrating can be used in a monochrometer, spectroscopy, or any other measuring devices that require calibration.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.During a telephone conversation with Scott Hewitt on August 8th, 2002, a provisional election was made without traverse to prosecute the invention I, claims 1-16 and 26. Affirmation of this election must be made by applicant in replying to this Office action. Claims 17-25

withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Specification

The disclosure is objected to because of the following informalities: on page 8, lines 7-20, reference is made to a thermal expansion coefficient of X picometers/^{0}C. The abbreviation used for picometers in the specification is "ppm." The correct abbreviation is "pm." Due to this typo, the phrase "parts per million" appears instead of "picometers."

Appropriate correction is required.

Claim Objections

Claims 6-8,11 and 14 are objected to because of the following informalities: due to apparent confusion over a typo in the specification, as detailed above, these claims refer to "parts per million" where the units should be "picometers." The claims shall be examined upon these merits. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kash (US 5,343,542) and in view of Vincent (US 5,144,498).

Regarding claim 1, Kash's optical demultiplexer has most of the structure including a fiber-optic input (Fig.1, item 101), a linear variable filter (Fig.1) having an etalon structure with a tapered spacer region (item 204) and a linear optical detector array (item 401) affixed to the filter and disposed along the taper direction. Kash does not have collimating optics.

Vincent teaches in col.24, lines 16-33 and in Fig.22A, that "...a light diffusor or concentrator or rearranger (item 164) may be included adjacent to the lens or focusing optics (item 163), in order to cause the light received at the filter (item 165) to be more uniform across the filter,..." Though Vincent does not have a fiber optic input, it would be appreciated by one skilled in the art that a divergent light source, such as an LED, light bulb or fiber optic tip, would have to be mated with collimating optics in almost any application. This way, the light beam will evenly illuminate a sample or device for an improved response from a detector, or, through the use of further optics, the light beam can be focused onto an object or diverged in a more controlled manner depending upon the application. Second, Kash's waveguide (item 201) serves the function of collecting the divergent light rays from the optical fiber tip and illuminating the entire etalon structure along the taper direction such that the full bandwidth carried by the optical fiber is incident onto the filter. Collimation optics would perform the same function. Third, Vincent teaches that optics can be added between a light source and a tapered, etalon filter to rearrange the light as needed, for example, to make the illumination more uniform across the filter. Therefore, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to use collimating optics in conjunction with an input fiber optic tip in order to evenly illuminate a bandpass filter. If the incident light was only on a portion of the filter, then only a bandwidth smaller than the intended bandwidth would pass through the filter, and therefore part of the bandwidth (or, information, for the application of multiplexing in optical communication) would be lost.

With respect to claim 2, the structure as applied above against claim 1 applies here and the following. Kash does not have a magnifying lens and a collimating lens, but, as Vincent teaches, it is known in the art that a number of arrangements of optics between a light source and an etalon filter, such as a light diffuser and focusing optics, are appropriate to completely illuminate the filter. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a magnification lens to controllably diverge the light output from the optical fiber and collected with a collimating lens such that the entire filter is illuminated along the taper direction. Since the length of the taper direction is fixed by the desired bandwidth and taper angle, the light beam would have to be manipulated in order to illuminate the entire taper direction length such that the full bandwidth carried by the fiber optic is subject to separation/filtering.

Claims 3-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kash and Vincent, and in further view of Takashashi (Applied Optics, vol.34, No.4, pp.667-675).

In regards to claim 3, the structure as applied against claim 1 above applies here and the following. Kash's tapered etalon structure has a tapered spacer region of SiO_2 and a first and second reflector that has a plurality of reflecting layers with alternating high and low indices of refraction. Neither of these layers are SiO_2. Takashashi discloses the use of SiO_2 in the

reflecting layers of etalon bandpass filters for use as the low index material. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use SiO_2 as the low-index material in the reflecting layers. SiO_2 is an extremely understood and well-characterized material in the art, and it is cheap and simple to manufacture. Also, it would be a perfect thermal match to the SiO_2 spacer material such that the thermal stability of the filter would improve.

With respect to claims 4 and 5, the structure as applied above against claims 1 and 3 applies here and the following. The use of Ta_2O_5 and Nb_2O_5 are disclosed by the applicant to be well-known in the art for use as high index materials in optical applications. Also, Takashashi specifically uses Ta_2O_5 as one of the test materials with SiO_2 in multilayered reflectors with marked success. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use either Ta_2O_5 or Nb_2O_5 as high index materials for multilayer reflectors.

Regarding claims 6-8, the structure as applied above against claim 1 above applies here and the following. Each of these claims refers to thermal stabilities of less than 50, 25 and 10 picometers/^{0}C, respectively. Though Kash does not make reference to thermal stability, Takashashi describes a single-cavity etalon bandpass filter with multilayered reflectors with thermal stabilities at a center wavelength of 1540nm to be as low as 5 picometers/^{0}C, which falls within the range of each claim. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have such a structure with thermal stabilities less than 10 picometers/^{0}C.

With respect to claims 9 and 10, it would be appreciated by one skilled in the art that a Fabry-Perot etalon structure is commonly used as a bandpass filter. A band edge filter (claim 10) is considered equivalent to a bandpass filter, and therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an etalon structure as a bandpass filter.

Regarding claim 11, Kash has the structure of a fiber optic input, a linear variable bandpass filter having an etalon structure with a tapered spacer region, and a linear optical detector array disposed along the taper direction. Kash does not disclose a magnifying lens or a collimating lens, and he does not specify a thermal stability less than 50 picometers/^{0}C.

However, as argued against claim 6 above, Takashashi describes an etalon structure with multilayered reflectors that have thermal stabilities far lower than 50 picometers/^{0}C on a central wavelength of 1540nm.

Further regarding claim 11, it is argued against claims 1 and 2 above that the use of a collimating lens is quite common and necessary when dealing with a divergent light source, such as a fiber optic tip. Vincent teaches that there are many ways of illuminating an etalon structure, one of which was to have some sort of diverging optics in order to illuminate the entire etalon along the taper direction. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a magnification lens to widen the beam to illuminate the entire length of the etalon's taper direction and use a collimating lens to collect the divergent light and illuminate the filter.

With respect to claim 12, the structure as applied above against claim 11 applies here and the following. Though none of the references disclose a specific length of a detector array, the

length of the array is naturally going to be dependent upon the length of the taper direction of the etalon, which is, in turn, determined primarily by the desired bandwidth and the taper angle. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a detector array to match the final length of the etalon such that the entire bandwidth passed by the filter is detectable.

In regards to claim 13, the structure as applied against claim 11 above applies here and the following. Takashashi discloses a single-cavity, multilayered reflector etalon structure using Ta_2O_5 and SiO_2 alternating layers that has a FWHM separation of 0.5nm on a central wavelength of 1540nm (pp.670, Table 3). It would have been obvious to one of ordinary skill in the art at the time the invention was made that this result falls within the range of 0.6nm at a center wavelength between 1530-1600nm as claimed.

Regarding claim 14, Kash has the structure of a fiber optic input, a linear variable bandpass filter having an etalon structure with a tapered spacer region, and a linear optical detector array disposed along the taper direction. Kash does not disclose a magnifying lens or a collimating lens, he does not specify a thermal stability less than 50 picometers/^{0}C, a 50% bandwidth of 0.6nm or less at a center wavelength between 1530-1600nm, and a length of 12mm or less for the detector array.

As argued above against claims 6 and 11, Takashashi discloses a thermal stability far below that of 50 picometers/^{0}C. As argued above against claim 13, Takashashi also discloses a FWHM of 0.5nm at 1540nm. As argued above against claim 12, the length of the detector array will obviously be based upon the final length of the etalon's taper direction. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the

data provided by Takashashi fall within the ranges as claimed, and that the detector array should be as long as the taper direction of the etalon such that the entire bandwidth is detectable.

Regarding claims 15 and 16, it would be obvious to one skilled in the art to have detector resolution around 3 Angstroms or less when the FWHM of the device is to be less than 6 Angstroms for each wavelength. It would be appreciated by one skilled in the art that 0.3nm resolution is the minimum requirement to be able to resolve a FWHM less than 0.6nm.

With respect to claim 26, Kash has the structure including an optical fiber input, a linear variable filter having an etalon structure with at least one tapered spacer region and a detector array affixed to the filter. Kash does not disclose the periphery network and analyzer.

Vincent discloses the use of a computer to analyze the output from the etalon (Fig.28, item 227). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have an analyzing device that monitors the wavelengths detected by the detector array. The whole point to the detector array is to gather data that is used to do a number of things, such as measure intensity, position, etc., of the wavelengths passing through the etalon.

It would also be appreciated by one skilled in the art that an optical tap, such as a beam splitter or the like, would have to be inserted into an optical network such that the signals can be sampled, but not removed from the line or attenuated significantly. Such a tap would have to have input and output fiber optics for signal transfer.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R Artman whose telephone number is (703) 305-0203. The examiner can normally be reached on 8am - 4:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (703) 305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

August 26, 2002

ROBERT H. KIM
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